Commercial Space Transportation Advisory Committee
May 6, 1999, Spring Meeting

MINUTES

COMSTAC Chair, Steve Flajser, convened the meeting at 8:30 a.m., and welcomed COMSTAC members and guests. His first order of business was to announce five new COMSTAC members: Dr. John M. Logsdon, Director of the Space Policy Institute and the Center for International Science and Technology Policy, George Washington University; Dr. Ray Colladay, President, Lockheed Martin Astronautics; Ms. Lauri Fitz-Pegado, Vice President, Global Gateway Management, Iridium, Inc.; Mr. Russell D. Turner, President and CEO, United Space Alliance; and Mr. Roscoe M. Moore, Law Student, Georgetown University and the first to be appointed in a new Under-30 category. Mr. Flajser recognized COMSTAC member, Tom Moyer, attending for the first time from the Alaska Governor′s Office and announced the selection of member, Bob Cowls, as the new Chair of the Risk Management Working Group.

Chairman Flajser pointed out that currently the U. S. commercial space transportation industry is experiencing some difficulties just as it did about 12 to 14 years ago. He stated his belief that these down periods occur from time to time, but through government and industry cooperation, these problems could be solved, allowing the industry to move forward into the 21st century. Next, he observed that the industry is fortunate to have the support of and the regulatory regime established by the Department of Transportation (DOT) and the Federal Aviation Administration (FAA), and he acknowledged the excellent partnership between industry and the FAA.

Report on AST Activities

Ms. Patricia G. Smith, Associate Administrator for Commercial Space Transportation, provided a comprehensive update of activities by her office, the Associate Administrator for Commercial Space Transportation (AST). She began by reporting on AST′s regulatory initiative, noting that AST published a Notice of Proposed Rulemaking (NPRM) on Reusable Launch Vehicle operations before the April 28th deadline which Congress had mandated.

She also noted that the Final Rule on Licensing Launches from Federal Ranges had also been published; that NPRMs for Financial Responsibility Requirements for Reentry Operations, Licensing Requirements for Operation of a Launch Site, and Licensing Requirements for Launches from non-Federal Launch Sites, and an advanced NPRM for Exempted-Class Rockets are all under development. Finally, under regulatory activities, Ms. Smith reported that AST has also published draft advisory circulars on the RLV System Safety Process and Expected Casualty Calculations for Commercial Space Launch and Reentry Missions. She reported that all existing AST regulations are expected to be updated by 2000.

Under AST licensing activities for the first half of FY99, Ms. Smith reported that AST has monitored 11 licensed commercial launches, including the first successful Sea Launch

mission, the first launch of a Russian satellite, Bonum-1 by Boeing, the launch of a Republic of China satellite, and satellites launched for Japan and Brazil.

For international activities, Ms. Smith reported on her upcoming trip to Paris for the first World Summit on Space Transportation Business and to London to meet with representatives of the British National Space Center for discussions regarding issues of concern to the U. S. industry. She also noted that AST is continuing to monitor the activities of Beal Aerospace and Kistler Aerospace, both proposing to launch from international locations.

Ms. Smith reported on other AST activities and initiatives including AST's work with the Air Force on exploring the future of the national space ranges especially in light of the growing number of commercial launches. She noted that part of this effort included an independent technical assessment of Air Force public safety methods by the National Academy of Sciences and a review of EWR 127-1, the basic launch safety document for the Eastern and Western ranges. Ms. Smith also reported on FAA's highly successful Second Annual Commercial Space Transportation Forecast Conference, held February 9-10, in Washington, DC

Remarks by the FAA Administrator

COMSTAC members and guests were welcomed and heard opening remarks by the FAA Administrator, Jane F. Garvey. Ms. Garvey highlighted the accomplishments of AST, especially in the area of regulation development, including the recent publication of the Final Rule on Licensing Launches from Federal Ranges and an NPRM on Reentry Operations.

Ms. Garvey discussed the partnership among AST and other FAA Lines of Business for work on the development of a Space and Air Traffic Management System. She also talked about FAA's support of the extension of government third-party liability for commercial launch operations in the Commercial Space Launch Act.
Ms. Garvey concluded her remarks by expressing her appreciation for the work of the COMSTAC and emphasizing the DOT and FAA commitment to the economic health of the U.S. commercial space transportation industry and especially to safety during commercial launch operations.

OSTP/NSC Interagency Review of Space Launch Ranges

Vic Villhard, Senior Advisor in the Office of Science and Technology Policy (OSTP) briefed the Committee on a newly-initiated interagency review to be led by the OSTP and the National Security Council (NSC). According to Col. Villhard, the review will focus on the management and use of the U. S. space launch bases and ranges, primarily those at Cape Canaveral and Vandenberg. He stated that one impetus for the review is the fact that commercial launches now outnumber launches from the other U. S. space sectors.

Col. Vilhard's briefing included a description of the process and a schedule for the review. He outlined the process as visiting U. S. launch bases, obtaining inputs from the Air Force Spacelift Task Force, obtaining input from the Federal interagency group, and finally

reaching consensus on the strategy for the future and for the implementation steps. Col. Villhard reported that by the end of July, the first draft of a report should be completed, and the final report completed in the fall. He noted that the report will look at five elements: base ownership, supporting infrastructure, space launch operations facilities, range facilities and systems, and safety responsibility and systems.

Member John Logsdon asked Col. Villhard whether a technical assessment of the need for modernization would be part of the review. Col. Villhard responded that the group would use technical assessments already conducted by the Air Force. Member Tom Moyer inquired about the type of information that would be required from commercial spaceports for the review. Col. Villhard responded that the group would welcome recommendations in this area.

Commercial Space Transportation Policy Review

Member John Logsdon presented a brief description of a proposed review of the policy framework underpinning the U.S. commercial space transportation industry. He noted that the industry was created by a series of policy decisions including commercializing ELVs (1983), the Commercial Space Launch Act of 1984, the decisions which took the Shuttle out of commercial markets after Challenger (1986), DOD ELV procurements (1987 and 1988), and the 1988 Amendments to the Commercial Space Launch Act. He also noted that the industry operates under the current 1984 National Space Transportation Policy and the 1996 National Space Policy.

Dr. Logsdon stated that the main purpose of the review will be to determine whether this policy framework is working, which current policies and laws are essential if the industry is to be globally competitive, and which current measures are counterproductive for the industry. He expressed his desire and that of the COMSTAC Chair that, in the process of the review, COMSTAC members begin thinking about strategic policy issues for the industry for the next 3 to 5 years.

Commercial Launch Legislative Update

The legislative update was presented by Mark Ashby, Legislative Counsel to Louisiana Senator John Breaux. Mr. Ashby's update focused on the legislation introduced by Senator Breaux, S. 469, the Commercial Space Transportation Cost Reduction Act. He began by noting that the idea of the Bill is for the government to provide assistance to the U. S. commercial space launch industry to get it through the financial bottleneck that it is currently experiencing.

Mr. Ashby described the main provisions of the bill, stating that it was primarily a loan guarantee program, using the Title XI Loan Guarantee Program (for shipbuilding) as a model; that it would be administered by the Secretary of Transportation; that Shuttle upgrades, but not EELV, would be included; that the initial funding would be $500 million with other annual appropriations as necessary; that the guarantees would cover 80% of the total capital requirement; that the repayment would be for 12 years; that launch sites are not included; and that there is a 10 year sunset for the Bill. He stated the belief that, in addition to assisting the industry financially, the Bill would encourage competition on government

specific requirements.

COMSTAC member, John Logsdon, inquired whether the bill's approach would be compatible with GATT trade regulations. Mr. Ashby replied that this type of approach was looked into but currently is not being used. COMSTAC member, Russell Turner inquired about the source of the $500 million funding. Mr. Ashby replied that NASA funding for Research and Development was one source of funding currently under consideration for the loan guarantee program.

In response to a question about whether big companies would have an unfair advantage over smaller companies in consideration for loans, Mr. Ashby replied that the program would seek to diversify the portfolio of the loan guarantees so that small and/or entrepreneurial companies, that don't have track records like larger companies would be equal participants in the program.

COMSTAC member, John Logsdon, also asked how the criticism that the government would be in a position to pick winners and losers could be avoided. Mr. Ashby responded that to minimize that criticism, industry has been extensively involved in establishing the program, and that other industry segments, including insurance, risk management and financing, are also heavily involved.

NAS Architecture for SATMS

Greg Burke, Manager of the NAS Architecture Branch of FAA's Associate Administrator for Research and Acquisition, reported on the National Airspace System Architecture (NAS) for the Space and Air Traffic Management System (SATMS). He began by discussing the FAA's efforts to modernize the current NAS, stating that the two main reasons for modernization are the increased growth of air traffic, both domestically and internationally, and the need to modernize old and outdated NAS facilities and equipment.

Mr. Burke outlined 7 goals for NAS modernization, including safety, accessibility, flexibility, predictability, capacity, efficiency and security. He also outlined the steps that have been taken in the development of the Architecture, including costs and integration of the various systems including procedures, automation, certification, avionics, staffing, facilities, training, airports, environment, energy, human factors, and navigation. He pointed out that this process also includes the integration of commercial space transportation operations. Finally, he explained that his office has also developed a database which goes out to year 2015 and can be used to do what-if scenarios and other applications.

COMSTAC Deputy Chair, Livingston Holder asked Mr. Burke, whether funding profiles for NAS upgrades were projected using the database and whether these funding profiles were part of the funding requests for future activities. Mr. Burke replied that his office does use the database for funding projections.

WORKING GROUP REPORTS

Technology and Innovation Working Group

Henry Minami, Marketing Manager for Propulsion Systems, The Boeing Company presented the report for the Technology and Innovation Working Group (TIWG). Mr. Minami was serving as alternate for TIWG Chair, Paul Fuller. Mr. Minami reported on activities by the TIWG since the last COMSTAC meeting in October 1998, including:

- two meetings with the Air Force EELV System Program Office (SPO) in Los Angeles in January 1999 for the 6th meeting on EELV issues and again in February 1999 for an EELV Mission Integration Meeting;
- two meetings with NASA's Code R regarding NASA's in-space transportation R & D program in January 1999 to review NASA's technology prioritization approach and in May 1999 to review the status of NASA's technology prioritization;
- a tour of Rocketdyne's booster rocket engine production facilities in January; and
- the development and completion of the 1999 update for the ***Commercial Geosynchronous Orbit Spacecraft and Launch Vehicle Mission Model*** (formerly entitled the GEO Commercial Spacecraft Mission Model). Mr. Minami noted that for 1999, the Mission Model would be combined with AST's Low Earth Orbit Commercial Market Projections to become one report, entitled ***1999 Commercial Space Transportation Forecasts***.

Mr. Minami turned the floor over to Mr. Don Mac Kenzie, from Hughes Space and Communications, Inc., who provided a briefing of the 1999 Mission Model Update.

1999 Update: GSO Spacecraft and Launch Vehicle Mission Model

Mr. Mac Kenzie, reported on the development, the methodology, and the results of the 1999 GSO Mission Model Update. Mr. Mac Kenzie served as Team Leader for the work on the Mission Model. He noted that the goal for the development of the Mission Model is to forecast the demand for commercial launches and attain industry agreement on worldwide demand for addressable commercial GSO spacecraft launch services. He reported that the survey for the study was sent to 55 industry organizations, and from that, 21 spacecraft manufacturers, operators and launch service providers responded.

He described the methodology as twofold using a near-term forecast (1999-2001) which included industry consensus forecast, published manifests, satellite readiness dates for uncertain projects, plans of existing satellite operations, and timing and likelihood of new opportunities; and a long-term forecast (2001-2010) which covered planned missions, undefined future launch agreements, replenishment of existing or soon-to-be launched systems, unidentified growth opportunities, and attrition.

Mr. Mac Kenzie explained that based on the trend toward heavier satellites and the introduction of EELV and other new, higher performing launch vehicles, a better distinction in the heavy category was needed for mass distribution. He stated that the upper mass range was modified to be 9,000 to 12,000 pounds, and a new category was created for 12,000 pounds and above.

Mr. Mac Kenzie summarized three major findings of the study: the average annual demand for launches is approximately 33 per year; the 1999 near-term forecast is greater than last

year due to supply-side problems, and payload mass is predicted to grow significantly.

Mr. Minami concluded the TIWG report by listing future plans for the TIWG, including

- a presentation of the 1999 COMSTAC (along with the 1999 LEO Market Projections) to the appropriate U.S. Government agencies, including a presentation to the Air Force EELV SPO in August 1999;
- continuation of periodic meetings with the Air Force EELV SPO; and
- submission of comments on technology recommendations in June 1999 for the NASA In-Space Propulsion Technology Program.

Mr. Minami made a motion that the full Committee adopt the 1999 COMSTAC Mission Model. Deputy Chair, Livingston Holder, seconded the motion, and the report was adopted by the full Committee.

1999 LEO Commercial Market Projections

Brett Alexander, Senior Policy Analyst, FAA/AST, reported on the 1999 LEO Commercial Market Projections. He pointed out that the forecast period for the study is 1999 through 2010 and that the study is an assessment of commercial launch demand for all non-geosynchronous orbits (NGSO) including LEO, medium earth orbit (MEO), and elliptical orbits (ELI), and all commercial space systems including communications (approximately 90%), remote sensing, foreign scientific payloads launched commercially, and one new system--CD radio (a former GEO system that switched to a highly elliptical orbit to do digital audio-radio broadcasting over North America). He noted that the communications systems fall into 3 categories: Little LEOs (narrowband data communications, e.g., ORBCOMM), Big LEOs (mobile and fixed-site voice, e.g., Iridium and Globalstar), and Broadband LEOs (high-bandwidth communications, e.g., Teledesic). Mr. Alexander summarized the results of the report as:

Two market scenarios:

1. a baseline scenario with 4 big LEOs, 3 little LEOs, and 2 broadband LEOs
2. a robust scenario with 5 big LEOs, 4 little LEOs, and 3 broadband LEOs

Both scenarios include the operations and maintenance launches for end-of-life replacement, launches of remote sensing and foreign science payloads, and CD radio launches.

Payload projections: Baseline Scenario: 975 payloads over 12 years.
Robust Scenario: 1,195 payloads over 12 years.

Launch demand: (Assessed for two launch vehicle sizes: small (<5000 lb, nm, 28.5) and medium-to-heavy (>5,000 lb, 100 nm, 28.5).
Baseline scenario: 316 launches over 12 years; 15 medium-to-heavy launches and 11 small launches.
Robust scenario: 405 launches over 12 years; 21 medium-to-heavy launches and 13 small launches.

Mr. Alexander concluded that the same number of systems as was forecasted last year are expected to be deployed through 2010, but overall launch demand is projected to be less due to lower total mass of revised broadband LEOs and the use of higher performance EELVs for deployment launches of broadband LEOs. He also concluded that the demand for commercial launch services remains significant due to the large number of LEO systems that are being proposed.

COMSTAC member, Mike Kelly inquired whether the Big LEO companies perceived RLVs as being too small for their needs. Mr. Alexander replied that overall cost and ease of task were the main factors and that RLVs might be a cheaper means of launching some LEO constellations. COMSTAC member, Roscoe Moore, asked how failure rates figured into the projections for the study and also inquired about the use of larger launch vehicles versus smaller launch vehicles for replacements. Mr. Alexander replied that the report used the predicted rates provided by the companies. He also replied that it is too early to determine the launch vehicle size that will be used for replacements.

Reusable Launch Vehicle (RLV) Working Group

Michael Kelly, Chairman of the Reusable Launch Vehicle Working Group (RLVWG), reported on the work done by the RLVWG to produce a report, entitled ***Final Report on RLV Licensing Approaches***, which he presented to the Committee Chair and members. He acknowledge the work of several of the working group members, including Paul Birkeland and Bob Meuser of Kistler Aerospace; Carl Meade, Lockheed Martin; Rob Wolf, Pioneer Rocketplane, and Bill Gaubatz, Universal Space Lines. Mr. Kelly highlighted the work done by Bob Keltner, from his company, Kelly Space & Technology, for his work in coordinating the project team for the report.

Mr. Kelly outlined the contents of the report, including sections on critical safety issues, FAA Guidelines, and a regulatory framework for licensing RLV launches. He noted that the regulatory framework called for a licensing philosophy which would include all RLV concepts and which recommended that each RLV concept have a distinct licensing plan based on FAA Guidelines. He added that the licensing philosophy also recommended that completion of a licensing plan would result in the issuance of a FAA license, and pointed out that one of the most difficult and controversial issues has been that of certification for RLVs.

Mr. Kelly outlined the regulatory environment proposed in the report as one that safeguards public safety, enhances U.S. competitiveness in the world industry, accommodates diverse systems and approaches to licensing, accommodates and encourages innovative use of technologies, and allows for evolution of the licensing regime. He noted that the report included a specific recommendations to adopt a licensing framework which assures licensing if an applicant demonstrates compliance with Ec criterion and allows an applicant to negotiate a plan which could be equivalent to the Ec requirement; and to omit a certification procedure for RLV licensing at this time. Mr. Kelly also discussed future activities for the RLVWG including such tasks as reviewing and commenting on the NPRM for RLV Licensing and reviewing ELV license information for applicability. Member, Lou Gomez inquired as to whether the working group had a chance to review public comments regarding

RLV licensing. Mr. Kelly advised that public comments had not been reviewed and incorporated since they did not fall under the purview of the working group. COMSTAC member, Russell Turner, suggested that the RLVWG develop recommendations for increased FAA resources to support future processing and review of RLV licensing plans and Mr. Kelly agreed.

Risk Management Working Group

The Risk Management Working Group (RMWG) report was presented by Mr. Robert Catania, The Boeing Company. (Bob Cowls, Chair of the Working Group, had been called away due to an emergency). Mr. Catania reported on the issues discussed during the RMWG meeting on Wednesday, including indemnification coverage for commercial launch operations, reciprocal waivers of claim, the Air Force Commercial Space Operations Support Agreement (CSOSA), State Department oversight of export controls, and NASA indemnification.

Mr. Catania pointed out that working group members did agree that one of the most important issues to monitor was that of indemnification. He pointed out that NASA would no longer be using Public Law 85804 as the indemnification scheme to protect a launch of a NASA payload, but instead, was publishing an NPRM proposing the use of Title 482, the NASA Space Act. In addition, he noted that the Air Force is also proposing the use of a hybrid indemnification scheme which is part Public Law 85804 and part Commercial Space Law Act. He explained that the Air Force scheme would use the Maximum Probable Loss amounts established by the FAA to protect government property.

Mr. Catania concluded his report by noting that the RMWG did not have a specific recommendation for the Committee at that time, but would be monitoring the government schemes for financial responsibility and allocation of risk, since there appears to be increasing fragmentation. He stated that hopefully the RMWG would work with the government to create a stable allocation of risk scheme which would be beneficial to the U.S. commercial launch industry.

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Wrap Up

Since there was no new business, the meeting was adjourned at 12:38 p.m., subject to the call of the Chair.

Steven Flajser, Chairman, COMSTAC

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Livingston Holder, Deputy Chairman, The Boeing Company
Eleanor Aldrich, AIAA

Mark Bitterman, Orbital Sciences Corporation
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Patricia Fresh, Moonspace
Louis Gomez, New Mexico Office of Space Commercialization
Richard Hieb, AlliedSignal Technical Services, Inc.
Michael Kelly, Kelly Space and Technology
John Logsdon, George Washington University
Roscoe Moore, Law Student, Georgetown University
Tom Moyer, State of Alaska, Governor's Office
Russell Turner, United Space Alliance

Alternates
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Robert Martin for Bary Bertiger, Motorola
Henry Minami for Paul Fuller, Rocket Systems Services, Inc.
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